MISSOURI DEPARTMENT OF NATURAL RESOURCES
AIR AND LAND PROTECTION DIVISION
ENVIRONMENTAL SERVICES PROGRAM
Standard Operating Procedures

SOP #: MDNR-FSS-206 EFFECTIVE DATE: February 17, 2004

SOP TITLE: Decontamination Procedures for Sampling Equipment in the Field or Laboratory

WRITTEN BY: Eric Sappington, Environmental Specialist IV, Field Services Section, ESP

APPROVED BY: Earl Pabst, Director, ESP

SUMMARY OF REVISIONS: Minor updates have been made throughout the document.

APPLICABILITY: These procedures apply to ESP field staff who must decontaminate sampling equipment either in the field or at the laboratory.

DISTRIBUTION: MoDNR Intranet
ESP SOP Coordinator

RECERTIFICATION RECORD:

Date Reviewed				
Initials				

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) describes how to properly decontaminate used sampling equipment. These procedures are appropriate for decontamination that is performed either in the field or at the Environmental Services Program (ESP) in a laboratory setting. Non-dedicated sampling equipment (i.e. equipment that is used to collect more than one sample) must be decontaminated between samples to prevent cross contamination. Procedures for proper waste handling and disposal are also described within this SOP. The importance and practice of collecting rinsate blanks (equipment blanks) to document the effectiveness of the decontamination procedures is also discussed. The procedures described within this SOP are applicable to ESP field staff who must decontaminate sampling equipment.

2.0 HEALTH AND SAFETY REQUIREMENTS

Appropriate personal protective equipment (PPE) must be worn when following decontamination procedures. At a minimum, the PPE should include safety glasses and protective gloves. Additional PPE may be necessary depending upon the particular type of equipment being decontaminated, the specific hazards of the contaminants, the specific type of chemicals being used for decontamination, the setting (i.e. whether in the field or in the lab) and any site specific Health and Safety Plan (HASP) requirements that may apply. If the work is being conducted at a hazardous waste site or otherwise meets the definition of Hazardous Waste Operations and Emergency Response (HAZWOPER) activities, there should be a site specific HASP that describes the type of PPE needed for the site and may list other health and safety requirements.

While the decontamination procedures have been changed in an effort to reduce the potential exposure to the hazardous chemicals used for decontamination by using less hazardous substitutes, there may still be a need to use hazardous solvents and/or acids at times. Field staff should review specific chemical Material Safety Data Sheets for guidance on PPE and other health and safety requirements when working with any hazardous chemicals.

3.0 SUPPLIES AND EQUIPMENT

The following general list of supplies and equipment should be needed for decontamination:

- nitrile gloves
- safety glasses
- scrub brushes
- deionized water
- Simple Green cleaner and degreaser
- Liqui-nox or other phosphate-free detergent
- paper towels or Kimwipes

Optional supplies that may also be needed include:

- additional PPE
- plastic sheeting
- aluminum foil
- clean, 5-gallon buckets
- dilute acids
- various solvents
- sample containers (for rinsate blank)
- analyte-free water (for rinsate blank)

4.0 PROCEDURE

It is important to note that not all decontamination procedures are equal. Some decontamination procedures may be as simple and brief as spraying deionized water on a pH probe and gently drying the probe with a soft paper towel or Kimwipe. Other decontamination procedures may be more complicated, such as disassembling a groundwater pump and decontaminating internal components. The procedures established in this SOP are generalized to an extent. Some pieces of equipment or instrumentation may come with instruction manuals that describe a decontamination or cleaning procedure that is different than the procedure described in this SOP. Field staff should follow the decontamination procedure specifically listed in an equipment instruction manual unless it is determined that the manufacturer's recommended procedure is ineffective. In addition, site specific sampling plans may dictate decontamination procedures that may be different from those described here and field staff should follow any site specific procedures if applicable.

The procedures described within this SOP are applicable to both field and laboratory settings. Field decontamination may require some supplies and equipment that are generally not needed in the laboratory. In the field, items such as clean buckets or tubs may be needed in lieu of having a sink to work in. Also, plastic sheeting may be needed to place on the ground to create a clean work station and provide for an area where decontaminated equipment can air dry.

While thorough decontamination is important for all types of sampling equipment, it is especially critical when the equipment is used for collection of water samples. Because water samples typically have low concentrations of contaminants to begin with and since water is considered a universal solvent and can easily pick up contaminants from dirty sampling equipment, it is easy to taint or bias a sample if contaminated equipment is used. Field staff should pay particular attention when decontaminating non-dedicated sampling equipment that is used for the collection of water samples and, as discussed later in Section 5.0, should collect rinsate blanks on a routine basis to verify the effectiveness of the decontamination procedures being used.

4.1 Non-electronic, Immersible Sampling Equipment

4.1.1 The first step in decontamination involves removing gross contamination, such as dirt or mud, using water spray (either tap or deionized water) and a scrub brush. If available, hot tap water is generally more effective than cold. Depending upon the particular contamination involved, it may be necessary to collect and contain the gross contamination and contaminated water or cleaning solutions for disposal as a hazardous waste. Refer to Section 4.3 for further guidance on disposal.

4.1.2 Simple Green cleaner should be sprayed on the equipment after the gross contamination has been removed. The ESP has several spray bottles containing various strengths of Simple Green cleaner available. Full strength should be used for equipment that is heavily contaminated (e.g., oily waste or other concentrated contaminants), while diluted solutions may be adequate for lighter contamination. Further scrubbing with brushes or scrub pads may be needed in conjunction with the Simple Green spray. Either deionized water or tap water should then be used to rinse the equipment. The process of using Simple Green spray, scrubbing with a brush or pad, and rinsing with clean water should be repeated until the equipment appears clean.

4.1.3 Next, the sampling equipment should be cleaned using a soapy solution of Liqui-nox or other phosphate-free detergent and water. Clean tap water or deionized water may be used to make the solution. A scrub brush or pad may be helpful in washing the equipment. After washing, the equipment should be rinsed well with deionized water and allowed to air dry on a clean surface. If the equipment is needed for further sampling as soon as possible, then clean paper towels may be used to dry off the equipment.

4.1.4 If the sampling equipment is not needed right away and must be stored after it has dried, then it should be stored in a manner to protect its cleanliness. Common methods for storing clean sampling equipment include placing the equipment in plastic bags or wrapping the equipment with aluminum foil.

4.2 Electronic, Non-immersible Sampling Equipment

Many types of portable electronic and other non-immersible pieces of sampling equipment come with operation instructions that include decontamination or cleaning procedures that should be followed. In addition, there are several SOPs specifically written for the operation and maintenance of certain types of sampling equipment that may also include decontamination requirements or guidelines. Field staff should read and follow all manufacturers' recommendations and review applicable ESP Standard Operating Procedures for specific guidance in decontamination of electronic sampling equipment.

There are many different types of portable electronic sampling equipment used by field staff. Some are used for water sampling (e.g., pH meters, oil-water interface probes), others are used for air monitoring (e.g., photoionization detectors), and others are used for sampling hazardous wastes (e.g., Setaflash flashpoint tester). Because the list of equipment is so varied, it becomes difficult to prescribe specific decontamination protocol that will be applicable for all types of equipment. For those pieces of equipment where specific decontamination procedures do not exist in either manufacturers' instructions or in other FSS SOPs, the following general decontamination procedures may be used:

4.2.1 Dirt should be wiped off the equipment using paper towels that have been moistened with deionized water, taking care to avoid getting the electronics wet. For wiping off delicate instruments, such as pH probes, Kimwipes or some other type of soft paper towel may be needed to avoid potential damage to the equipment. This may be the only step needed, particularly if the equipment is not heavily contaminated and there is no risk of cross contamination because the equipment does not come into direct contact with samples (e.g., photoionization detector).

4.2.2 If further cleaning is needed and there are pieces of the equipment that are easily removed that are immersible, then the immersible pieces may be cleaned following the steps listed under section 4.1.

4.2.3 Electronic equipment should always be left clean, charged, and ready for use for the next field staff member who may need it.

4.3 Disposal

4.3.1 Neither Simple Green nor Liqui-nox are considered hazardous under RCRA regulations and may be disposed of safely in a sanitary sewer system. In the field, both cleaning solutions can usually be safely discarded on the ground in the small amounts associated with field decontamination of equipment. Disposal of cleaning solutions directly into any waterway should not be done.

4.3.2 There may be instances where the type of contaminant being removed from equipment is toxic or hazardous enough to warrant collection and alternative disposal (i.e. as a hazardous waste) of dirty water and cleaning fluids associated with decontamination. Any site involving extremely hazardous contaminants that would warrant such extreme measures should be covered by a site specific HASP that should address decontamination procedures and proper disposal of investigation derived wastes.

4.3.3 In the event that other more hazardous chemicals are used in decontamination, as may be required by other FSS SOPs, manufacturers' recommended decontamination procedures, or a site specific HASP or sampling plan, then

proper disposal may require more stringent controls. In general, spent or contaminated organic solvents and acids should be considered hazardous waste and, as such, should be containerized in the field and returned to the ESP laboratory for proper disposal. For safe storage and proper disposal, spent solvents should be containerized and kept separate from spent acids.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

In order to document the effectiveness of a decontamination procedure, rinsate blanks must be collected and analyzed on a routine basis. An analytical result indicating a contaminated rinsate blank can be troublesome and raises several questions:

- Was the decontamination procedure truly ineffective or could something else have caused the contamination in the rinsate blank?
- Was the source of water used for the rinsate blank analyte-free?
- Were any of the samples cross-contaminated?
- Is the validity of the data package questionable?

If the analytical results indicate contamination in a rinsate blank, then further examination of the decontamination procedures used and the methodology followed for sample collection and handling may help to answer the above questions without invalidating the data.

The following procedure should be followed to collect a rinsate blank sample:

5.1 The equipment should first be decontaminated following manufactures' instructions or the procedures described in this SOP. Field staff should <u>not</u> use extraordinary measures when decontaminating the equipment just because a rinsate blank sample is to be collected, but should follow the procedures as usual.

5.2 Knowledge of the contaminants or chemicals encountered at a site is critical in determining the target compounds for the rinsate blank. If the specific contaminants are unknown, then it is important to at least be aware of the chemical group(s) that may be present. For example, while it may not be known that acetone is present at a site, there should at least be the suspicion that volatile organics may be among the group of contaminants present. Are heavy metals also present? What about base neutral organics? Knowledge of the target compounds dictates the type of analyses that should be conducted on the rinsate blank.

5.3 Once the target compounds have been determined, the source of water for the rinsate blank can be selected. It is important to select a source of water that is not contaminated with any of the target compounds (analyte-free). For example, while a deionized water source obtained from the ESP laboratory should not contain any detectable levels of heavy metals, it may be contaminated with low levels of a volatile organic compound (e.g., PVC pipe solvent). While it should be acceptable to use deionized water obtained from the ESP laboratory for a rinsate blank when

inorganic chemicals are the target compounds, it should not be used as the source when organic compounds are involved. The following table shows some basic groups of target compounds that may be requested for a rinsate blank and the source of water that must be used when collecting the rinsate blank sample.

Target Compounds	ESP Source Water For Rinsate Blank
Volatile organics	Deionized/Distilled Water From Volatiles Lab
All other organics	Deionized/Distilled Water From Organic Prep Lab
Inorganics	Deionized Water From ESP System

5.4 If source water for a rinsate blank sample must be taken to the field, then it must be stored in a clean container prior to use and kept away from potential contaminants while in storage. Glass sample jars, rather than plastic containers, are recommended for carrying source water for all organic analyses. Plastic storage containers such as cubitainers are appropriate for carrying source water for all inorganic analyses. A cooler or other storage container is recommended for storing and transporting containers of source water to the field, although the source water does not need to be kept on ice prior to collection as a rinsate blank sample. Upon collection, the rinsate blank sample should be treated like any other sample and should be kept on ice. For further information, refer to MDNR-FSS-018 *Sample Handling: Field Handling, Transportation, and Delivery to the ESP Lab.*

5.5 A rinsate blank sample should be collected by pouring the appropriate source water over the particular piece of decontaminated equipment being tested. If the equipment is designed to contain water (e.g., a bailer), then the source water should also be poured both into and over the equipment and then a rinsate blank sample should be collected by capturing water that contacted both the inside and outside of the equipment. Appropriate sample containers and preservatives should be used for the rinsate blank, and it should be collected, handled and preserved in the same manner as any other water sample. Refer to MDNR-FSS-001 *Required/Recommended Containers, Volumes, Preservatives, Holding Times, and Special Sampling Considerations* for further information.

5.6 Upon collection, a rinsate blank sample must be labeled and documented on a Field Sheet and Chain-of-Custody Record as any other sample would be. Refer to MDNR-FSS-003 *Sample Numbering and Labeling* and MDNR-FSS-002 *Field Sheet and Chain-of-Custody Record* for additional information.

6.0 REFERENCES

- MDNR-FSS-001 *Required/Recommended Containers, Volumes, Preservatives, Holding Times, and Special Sampling Considerations*

- MDNR-FSS-002 *Field Sheet and Chain-of-Custody Record*

- MDNR-FSS-003 *Sample Numbering and Labeling*

- MDNR-FSS-018 *Sample Handling: Field Handling, Transportation, and Delivery to the ESP Lab.*